MODIS
SCIENCE DATA SUPPORT TEAM
PRESENTATION

October 9, 1992

AGENDA   *Page*

ACTION ITEMS:

06/12/92 [Tom Goff, Carroll Hood] Develop separate detailed schedules using Microsoft Project for Level-1A and -1B software design and development. (Updated results for Level-1B were included in the handout on 10/02/92.) STATUS: Open. Due Date: 07/10/92

07/31/92 [Tom Goff, Ed Masuoka, Al Fleig] Develop the purpose and requirements for a packet simulator. Get more information on the packet simulator being developed by SBRC. (An updated requirements specification was included in the handout on 09/04/92. A copy, with a cover letter, should be sent to Jerry Hyde of SBRC for coordination with their requirements.) STATUS: Open. Due Date: 09/04/92

10/02/92 [Team] Prepare presentation materials for the MODIS Science Team Meeting. STATUS: Open. Due Date: 10/16/92

MODIS Airborne Simulator (MAS) Status

Liam E. Gumley
Progress up to 8 October 1992

(1) Software/data developments

This week a prototype version of a program to compute sensor weighted solar spectral irradiances was completed and tested. The program reads a file containing sensor response for a given channel, then reads solar spectral irradiance data over the same wavelength interval from the LOWTRAN7 database. The two datasets are interpolated using a cubic spline, and then the appropriate integrals are computed over the sensor response wavelength interval. Presently I plan to include this value (which is for the mean Earth-Sun distance) in the instrument configuration file. Then when a dataset is processed, the earth-sun orbit correction factor will be applied, and the solar spectral irradiances for each channel will be stored as a global attribute in each output NetCDF file.

Several small improvements were made to the NetCDF output format. First, a global attribute was added that contains the date and time the file was created. Second, two global attributes were added containing the total number of flight lines found in the Level-1B dataset, and the flight line number of the particular NetCDF file. These attributes should assist data users with file management.

Addition of temperature-to-radiance conversion tables to the NetCDF output files is the next planned development, to be started shortly.

(2) MODIS Level-2 Processing Shell Prototype

Through the efforts of J.J. Pan, a base map image of the continental US was obtained from EDC, to be used in land/water discrimination. This map is the base image used by EDC to register AVHRR data. The map projection is the Lambert Azimuthal Equal Area projection, and is stored at 1000 meter resolution. In order to determine the position in the map image of a given lat/long coordinate, the appropriate forward transformation equations were used to compute the distance in meters from the top left of the image to the lat/long coordinate in question.

Using an existing program that created images from MAS NetCDF files, a test program was created which checked the lat/lon of each pixel to determine if it was land or sea. If the pixel was determined to be sea, the brightness of the pixel was increased. One image section has been tested at present, and is shown overleaf. It can be seen that the land/ocean boundary is somewhat irregular, however further investigation ought to improve the result (this was a first cut).
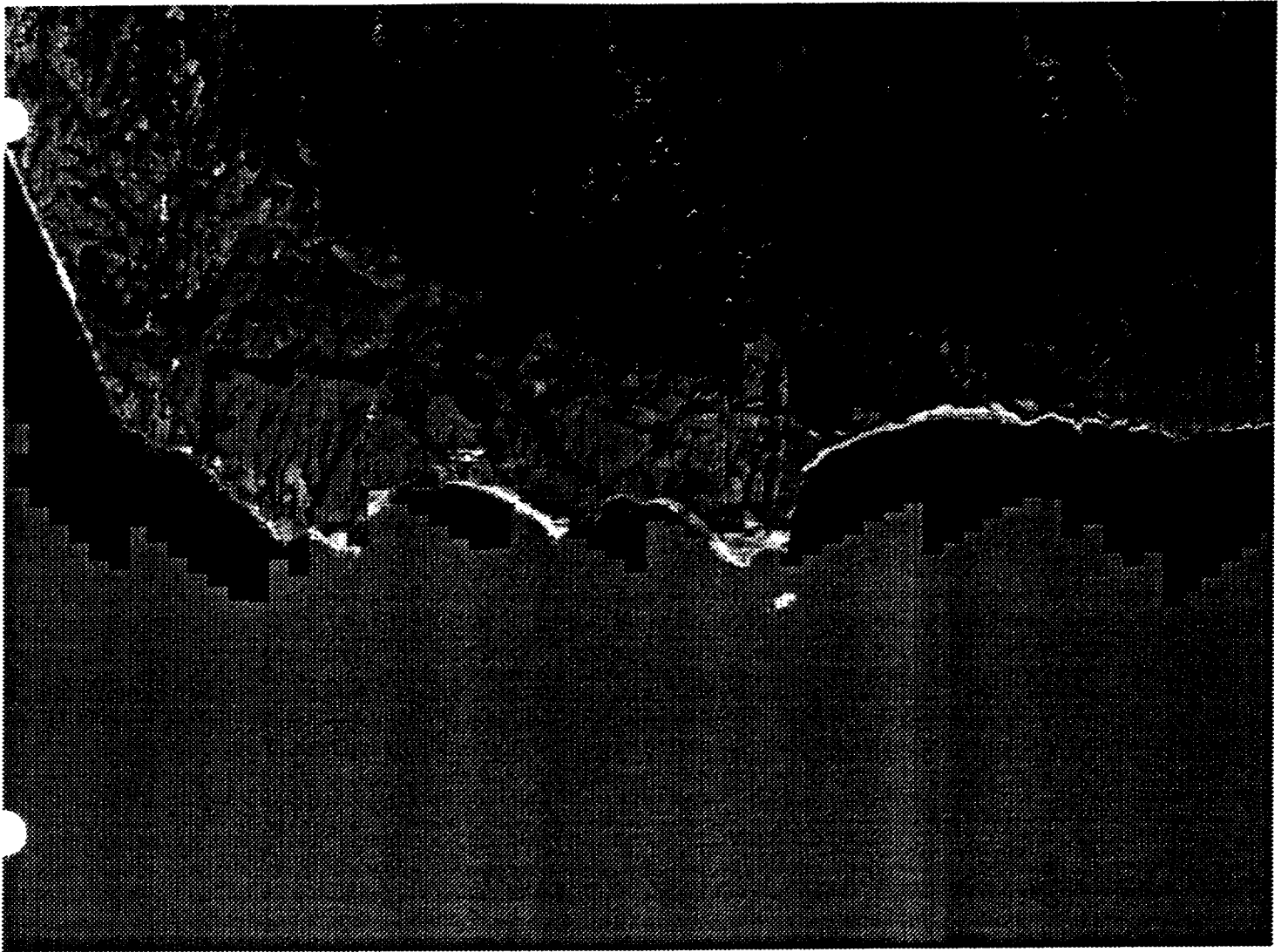
MODIS Science Data Support Team

MODIS Level-2 Processing Shell Prototype

- Explore concepts and techniques for eventual MODIS Level-2 processing shell
- control mechanisms, data flows, algorithm interactions, I/O redundancy, process scheduling, process efficiency
- Concept testbed only, not simulation of MODIS science
- Use MODIS Airborne Simulator (MAS) Level-1B data
- Use existing algorithms in best available state for Land/Water, Snow/Cloud, NDVI, SST, AOD
- Create Level-2 datasets (archive, metadata, browse)

NASA

DRAFT

MODIS Level-2 Processing Shell Design and Development

J. J. Pan
MODIS Science Data Support Team
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<u>Date: October 5 - October 9, 1992</u>

1. PGS Toolkit Study

I talked to Ted Meyer and Larry Fishtahler about the tools that might be required in the Level-2 shell design. Emphasis is on the computer languages interface tool, which is not addressed in the current PGS Toolkit Study Report, but will be needed in the interface of the shell and algorithms.

In order to minimize the modifications of Team Member's source code, we need an easy-to-use powerful tool which can provide a completely transparent, machine independent interface between C and FORTRAN subroutines/functions, and global data (i.e., structures and COMMON blocks). Currently the CFORTRAN tool is a good example, but its reliability is to be determined. I will write a short interface tool requirement to Ted.

Because the I/O redundancy removal is a major task in the shell design, I am evaluating the functions of the following four tools which could be used in the shell design at an early stage :

    (1). Production stream files I/O tools,
    (2). Memory request tools,
    (3). Memory management tools, and
    (4). Level 1-4 product access tools.

Production stream files I/O refers to files that exist for the duration of a sequential data process. Production stream files may exist until the processing is completed or the processing deadline is met.

The memory request tools and the memory management tools might provide the capability for "common" data sharing. There could be some interconnection between these two tools and the production stream files I/O.

The Level 1-4 product access tools will allow reading and writing of standard Level 1-4 science data products. Because tools will be defined for all standard structures, it is necessary to determine the data structures requirements as early as possible.

2. Algorithm Dependency Diagram

According to the comments received from Tanre recently, he does not want to be involved in data products 1556, 1557, and 3670. Also, he mentioned that data products 2424 and 2425 will be replaced by 3669, and data products 2015 and 2016 will be replaced by 3666. But, there are no products 3669 and 3670 in the publication of Output Data Products and Input Requirements, Volume III, Version 2.0, Science Processing Support Office (SPSO), August 1992.

I called Drs. H. D. Chang and B. Krupp from SPSO to confirm the inconsistency. Dr. Krupp mentioned that they understood this problem and an updated algorithm description will be available soon. But, the change of [2015,2016] to [3666] will cause some modifications to the algorithm dependency diagram. It is not clear, so far, how to revise the algorithm dependency diagram.

MODIS Level 1 Earth Navigation Software Evaluation

Paul A. Hubanks
09 October 1992

I received the USGS software used for the geolocation of AHVRR data yesterday (Thursday). A backup "save_set" file was ported to my account on the LTP/VAX. I used the backup utility to restore the software. This software was comprised of 910 modules, including 310 C routines.

I have also received some additional information on this software system called the AVHRR Data Acquisition and Processing System (ADAPS). The geometric registration segment of ADAPS is based on software developed by the staff of the Rosentiel School of Marine and Atmospheric Science at the University of Miami. The software uses daily adjustments of ephemeris data to update the orbital model of the satellite platform and combines this information with a sensor platform model to generate systematic correction parameters for the imagery. The software provides for further adjustment of the systematic parameters through the use of control points that correct for timing and/or attitude deviations. Control point selection is accomplished by superimposing World Data Bank II (WDBII) coastline and hydrographic linework on the image data via an image display device. An operator then selects a point near nadir and shifts the linework at 1 pixel increments until it coincides with the imagery. The magnitude of the shift is translated into a pitch/time adjustment. If desired, a second point, off nadir, can be selected in the same manner and used to update the adjustment for roll/yaw. The refined orbital model is then used to produce a precision corrected image.

I contacted the University of Miami to determine if their current techniques for correcting satellite clock error and improving satellite ephemeris differed from those used at USGS for AVHRR registration. I was able to ascertain the name of the resident expert on this subject, Dr. Jim Brown. Unfortunately, he is out on travel until Monday.

MODIS Level-1 Software Design Status
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8 October, 1992

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-- Miscellaneous Status--

- **PGS Toolkit Study Report** - I am in the process of writing a comments document pertaining to the PGS toolkit specifications as outlined in the PGS Toolkit Study Report.

- **HP 9000/730 Capabilities.** - I am in the process of learning how to set up the NCD Xterms in preparation for the system administration of the HP computer in order to be prepared for a move off site. One color NCD Xterm is now set up using the ltp640 Sun computer as the server for the Xterm software. This will be transferred to the HP machine in the future. There is one additional color NCD and two additional monochrome NCD to be added to the network. The additional color NCD has a current network address while the monochrome NCDs need network addresses assigned. Remember that the facility is scheduled to move the first of November.

- **Microsoft Project** - This project support tool is forever being utilized in the planning of the MODIS Level-A and Level-1B designs. Level-2 design efforts will be added to the suite of existing project files (workspace). A subscription to the independent Project Views newsletters for MS Project 3.0 users has been initiated.

- Futures -

- SLIP is supported on the NCD Xterms via the built-in serial port and can be used to test the forth coming slip server box when it arrives, before trying this over phone lines.

- Additional software will be loaded onto the modis1 computer to provide debugging, enhanced make, code checking, text processing, postscript conversions, screen dumps, etc. as time allows.